UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/720,693	10/02/1996	DAVID Y. KAO	11675.107	1934

22901 7590 02/22/2005

GREGORY M. TAYLOR
WORKMAN, NYDEGGER & SEELEY
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UT 84111

EXAMINER	
FOURSON III, GEORGE R	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 02/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 20040114

Application Number: 08/720,693
Filing Date: October 02, 1996
Appellant(s): KAO ET AL.

Gregory M. Taylor
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 10, 2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The brief does not contain a statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief. Therefore, it is presumed that there are none. The Board, however, may exercise its discretion to require an explicit statement as to the existence of any related appeals and interferences.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The rejection of claims 2-4,7-19,22-33 and 45-49 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,869,385	TANG ET AL	2-1999
JP-5-175190	Sharp Corp	7-1993
JP-62-48028	Toshiba	3-1987

Minegishi, K., et al., "A New Self-Aligned Framed Mask Method for Selective Oxidation", Japanese Journal of Applied Physics, Vol.20(1981) Supplement 20-i, pp.55-61

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7-11,13-19,22-33 and 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al in view of Minegishi et al.

Tang et al discloses a LOCOS process including formation of LOCOS mask layer 31, disclosed to be suitably a nitride layer over an oxide layer (col.1, lines 20-35 and col.5, lines 50-53) on a substrate, photolithographic patterning of the mask layer including selectively removing both layers with respect to the substrate to form a LOCOS mask, implanting silicon ions (col.6, line 59) which do not alter the electrical charge characteristics or conductivity type (col.6, lines 58-60) of the substrate such that the ions are prevented from penetrating under the patterned LOCOS mask layer wherein the ions damage the crystal structure and increase the oxidation rate of the implanted region (col.5 and col.6) followed by thermal

oxidation of the exposed substrate region in an oxygen ambient to create a field oxide layer (col.1, line 32 and col.5, line 65).

Tang et al does not disclose formation of spacers as part of the LOCOS mask formation process.

Minegishi et al discloses a LOCOS process including formation of a patterned nitride/oxide LOCOS mask, forming a nitride layer over the patterned LOCOS mask and anisotropic etching of the nitride layer to form spacers around the opening in the LOCOS mask and exposure of the resultant structure to an oxidizing ambient to create a field oxide layer (section 2 and figure 1).

Both of Tang et al and Minegishi et al are directed to local oxidation of silicon using a nitride/oxide oxidation mask. Minegishi et al teaches implantation of boron through the framed mask (page 56, col.1, lines 24-26) which ions are disclosed to be one of the suitable materials to increase the oxidation rate in the process of Tang et al (col.6, line 61). Therefor the teachings of Tang et al and Minegishi et al are analogous. It would have been within the scope of one of ordinary skill in the art to combine the teachings of Tang et al and Minegishi et al to enable the LOCOS mask formation step of Tang et al to be performed according to the teachings of Minegishi et al because one of ordinary skill in the art would have been motivated to look to analogous art teaching alternative suitable or useful methods of performing the disclosed LOCOS mask formation step of Tang et al and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07. Furthermore, one of ordinary skill in the art would have been motivated to combine the teachings for the reasons discussed by Minegishi et al, namely to achieve fine isolation width for MOS LSIs, to achieve the fine isolation width without a photoresist pattern used to make the conventional patterned LOCOS mask layer more narrow subsequent to patterning and to suppress bird's beak formation (abstract). Suppression of bird's beak formation is also a goal of Tang et al (col.3, lines 23-25) which would further suggest to one of ordinary skill in the art to look to the

teachings of Minegishi et al as a suitable method of achieving this aim. One of ordinary skill in the art would have had a reasonable expectation of success when employing the mask formation method of Minegishi et al as the mask formation step of Tang et al because of the disclosure of Minegishi et al that the framed mask can be used as a mask to implant boron ions, one of the preferred ions of Tang et al, prior to a LOCOS step.

One of ordinary skill in the art would have been led to the recited inclination angle in the implantation step of Tang et al to achieve a desired degree of lateral straggling according to teachings of Tang et al at col.6, line 65 to col.7, line 4).

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al in view of Minegishi et al as applied to claims 7-11,13-19,22-33 and 45-49 above, and further in view of Japanese Patent 5-175190.

Tang et al discloses that boron ions are one of the materials suitable as the implanted ions (col.6, line 61). The reference does not specifically disclose implanting more than one type of material through the LOCOS mask opening.

Japan '190 discloses implanting boron and silicon ions in a LOCOS process to create a field oxide region free of field inversion (abstract).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Japan '190 with those of Tang et al and Minegishi et al to enable formation of a field oxide region free of field inversion as disclosed by Japan '190.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tang et al in view of Minegishi et al as applied to claims 7-11,13-19,22-33 and 45-49 above, and further in view of Japanese Patent 62-48028.

Tang et al does not disclose removal of the photoresist layer after implanting.

Japan '028 discloses removal of photoresist pattern 4 subsequent to implantation within a region to be locally oxidized.

It would have been within the scope of one of ordinary skill in the art to remove the photoresist layer used to pattern the nitride/oxide LOCOS mask of the process of Tang et al in view of Minegishi et al after the implanting in view of the disclosure of Japan '028 that photoresist can be used as an implantation mask in a LOCOS process followed by removal of the photoresist which is in turn followed by the step of locally oxidizing the silicon substrate.

(11) Response to Argument

Applicant argues that Tang et al does not disclose making spacers in the opening of the patterned LOCOS mask layer. This is not in dispute and the rejection is predicated on this fact. Minegishi et al is relied on to provide motivation to form sidewall spacers in the opening of the LOCOS mask of Tang et al. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant's argument that there is no teaching or suggestion that the spacer of Minegishi et al would be suitable for use in the process of Tang et al is rebutted in the statement of the rejection above. To reiterate in part, both of Tang et al and Minegishi et al are directed to local oxidation of silicon using a nitride/oxide oxidation mask. Minegishi et al teaches implantation of boron through the framed mask (page

56, col.1, lines 24-26) which ions are disclosed to be one of the suitable materials to increase the oxidation rate in the process of Tang et al (col.6, line 61). Therefor the teachings of Tang et al and Minegishi et al are analogous. It would have been within the scope of one of ordinary skill in the art to combine the teachings of Tang et al and Minegishi et al to enable the LOCOS mask formation step of Tang et al to be performed according to the teachings of Minegishi et al because one of ordinary skill in the art would have been motivated to look to analogous art teaching alternative suitable or useful methods of performing the disclosed LOCOS mask formation step of Tang et al and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07. Furthermore, one of ordinary skill in the art would have been motivated to combine the teachings for the reasons discussed by Minegishi et al, namely to achieve fine isolation width for MOS LSIs, to achieve the fine isolation width without a photoresist pattern used to make the conventional patterned LOCOS mask layer more narrow subsequent to patterning and to suppress bird's beak formation (abstract). Suppression of bird's beak formation is also a goal of Tang et al (col.3, lines 23-25) which would further suggest to one of ordinary skill in the art to look to the teachings of Minegishi et al as a suitable method of achieving this aim. In view of the disclosure discussed above in the statement of the rejections that the LOCOS mask of Minegishi is useful as an implantation mask when implanting boron and that the LOCOS mask of Tang et al is useful when implanting boron or silicon one of ordinary skill in the art would have had a reasonable expectation of success when employing the mask of Minegishi et al in the implantation step of silicon ions of Tang et al.

Applicant argues that Minegishi et al discloses implantation of boron which is a conductive impurity. This is not in dispute and the rejection is predicated on this fact. Motivation to use of the mask of Minegishi et al in the process of Tang et al is provided in the statement of the rejection.

Applicant's arguments regarding the rejections of claims 2-4 and 12 rely on the above mentioned arguments and so are adequately addressed above. Furthermore, the claims stand or fall as a group with claim 47 as stated by applicant.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

George Fourson
Primary Examiner
Art Unit 2823

Gfourson
February 16, 2005

Conferees

Olik Chaudhuri

Wael Fahmy

JESUS JUANOS I TIMONEDA
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UT 84111